



HD2302.0 PHOTO-RADIOMETER

The **HD2302.0** is a portable instrument with a large LCD display. It measures **illuminance, luminance, PAR** and **irradiance** (across VIS-NIR, UVA, UVB and UVC spectral regions or measurement of irradiance effective according to the UV action curve). The probes are equipped with the SICRAM automatic detection module: in addition to detection, the unit of measurement selection is also automatic. The factory calibration data are already memorized inside the instruments. The *Max*, *Min* and *Avg* function calculate the maximum, minimum or average values. Other functions include: the relative measurement REL, the HOLD function, and the automatic turning off that can also be excluded. **The instruments have IP67 protection degree.**

INSTRUMENT TECHNICAL CHARACTERISTICS

Instrument

| | |
|---|---|
| Dimensions (Length x Width x Height) | 140x88x38mm |
| Weight | 160g (complete with batteries) |
| Materials | ABS |
| Display | 2x4½ digits plus symbols - 52x42mm Visible area: 52x42mm |

Operating conditions

| | |
|---------------------------|--------------------------------|
| Operating temperature | -5...50°C |
| Storage temperature | -25...65°C |
| Working relative humidity | 0...90%RH without condensation |
| Protection degree | IP67 |

Power

| | |
|------------------------------------|---|
| Batteries | 3 1.5V type AA batteries |
| Autonomy | 200 hours with 1800mAh alkaline batteries |
| Power absorbed with instrument off | 20µA |

Measuring unit

lux - fcd - µmol/m²·s - cd/m² - W/m² - µW/cm²

Connections

Input module for the probes 8-pole male DIN45326 connector

| ILLUMINANCE measurement probe LP 471 PHOT | | | | |
|--|--|-----------|----------|---------------------------|
| Measurement range (lux): | 0.01...199.99 | ...1999.9 | ...19999 | ...199.99·10 ³ |
| Resolution (lux): | 0.01 | 0.1 | 1 | 0.01·10 ³ |
| Spectral range: | in agreement with standard photopic curve V(λ) | | | |
| Class | C | | | |
| Calibration uncertainty: | <4% | | | |
| f ¹ (in agreement with photopic response V(λ)): | <8% | | | |
| f ₂ (response according to the cosine law): | <3% | | | |
| f ₃ (linearity): | <1% | | | |
| f ₄ (instrument reading error): | <0.5% | | | |
| f ₅ (fatigue): | <0.5% | | | |
| α (temp. coefficient) f ₆ (T) | <0.05%K | | | |
| Drift after 1 year: | <1% | | | |
| Functioning temperature: | 0...50°C | | | |
| Reference Standards | CIE n.69 - UNI 11142 | | | |

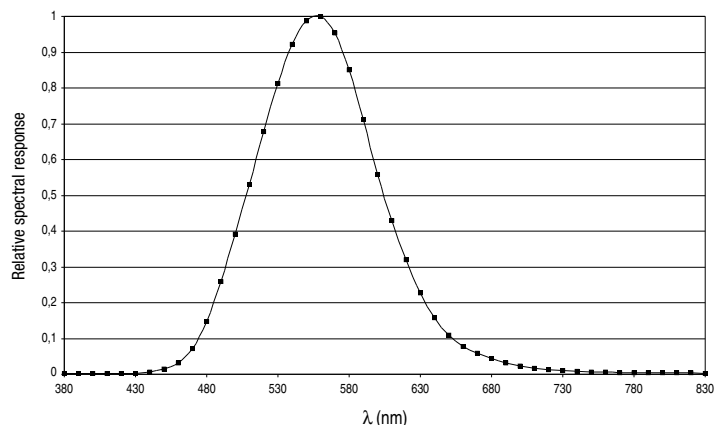
Photometric probe for **ILLUMINANCE** measurement, spectral response in agreement with standard photopic vision, diffuser for cosine correction. Measurement range: 0.01 lux...200·10³ lux.



| LUMINANCE measurement probe LP 471 LUM 2 | | | | |
|--|--|----------|---------------------------|---------------------------|
| Measurement range (cd/m ²): | 0.1...1999.9 | ...19999 | ...199.99·10 ³ | ...1999.9·10 ³ |
| Resolution (cd/m ²): | 0.1 | 1 | 0.01·10 ³ | 0.1·10 ³ |
| Optical angle: | 2° | | | |
| Spectral range: | in agreement with standard photopic curve V(λ) | | | |
| Class | C | | | |
| Calibration uncertainty: | <5% | | | |
| f ¹ (in agreement with photopic response V(λ)): | <8% | | | |
| f ₃ (linearity): | <1% | | | |
| f ₄ (instrument reading error): | <0.5% | | | |
| f ₅ (fatigue): | <0.5% | | | |
| α (temp. coefficient) f ₆ (T) | <0.05%K | | | |
| Drift after 1 year: | <1% | | | |
| Functioning temperature: | 0...50°C | | | |
| Reference Standards | CIE n.69 - UNI 11142 | | | |

Photometric probe for **LUMINANCE** measurement, spectral response in agreement with standard photopic vision, vision angle 2°. Measurement range: 0.1 cd/m²...2000·10³ cd/m².

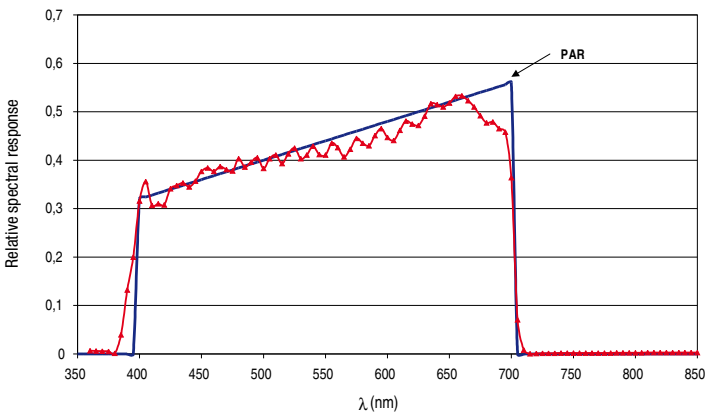
Typical response curve: probe LP 471 PHOT, LP 471 LUM2



| Quantum radiometric probe for the measurement of the photon flow across the chlorophyll range PAR LP 471 PAR | | | |
|--|----------------|----------------|--------------|
| Measurement range ($\mu\text{mol}/\text{m}^2\text{s}^{-1}$): | 0.01... 199.99 | 200.0...1999.9 | 2000...10000 |
| Resolution ($\mu\text{mol}/\text{m}^2\text{s}^{-1}$): | 0.01 | 0.1 | 1 |
| Spectral range: | 400nm...700nm | | |
| Calibration uncertainty: | <5% | | |
| f_3 (linearity): | <1% | | |
| f_4 (instrument reading error): | ± 1 digit | | |
| f_5 (fatigue): | <0.5% | | |
| Drift after 1 year: | <1% | | |
| Working temperature: | 0...50°C | | |

Quantum radiometric probe for the measurement of the photon flow across the chlorophyll range **PAR** (Photosynthetically Active Radiation 400nm...700nm), measurement in $\mu\text{mol}/\text{m}^2\text{s}^{-1}$. Measurement range: $0.01\mu\text{mol}/\text{m}^2\text{s}^{-1}$... $10\cdot 10^3\mu\text{mol}/\text{m}^2\text{s}$.

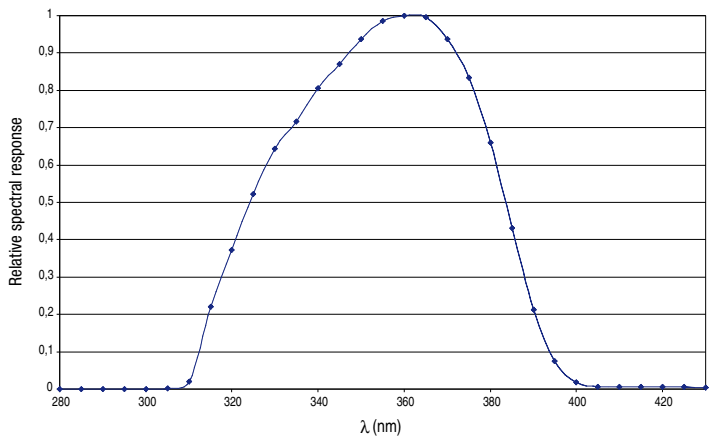
Typical response curve: probe LP 471 PAR



| IRRADIANCE measurement probe LP 471 UVA | | | | |
|--|---|------------------------|------------------------|------------------------|
| Measurement range (W/m^2): | $0.1\cdot 10^{-3}$... $999.9\cdot 10^{-3}$ | 1.000 ... 19.999 | 20.00 ... 199.99 | 200.0 ... 1999.9 |
| Resolution (W/m^2): | $0.1\cdot 10^{-3}$ | 0.001 | 0.01 | 0.1 |
| Spectral range: | 315nm...400nm (Peak 360nm) | | | |
| Calibration uncertainty: | <5% | | | |
| f_3 (linearity): | <1% | | | |
| f_4 (instrument reading error): | ± 1 digit | | | |
| f_5 (fatigue): | <0.5% | | | |
| Drift after 1 year: | <2% | | | |
| Working temperature: | 0...50°C | | | |

Radiometric probe for **IRRADIANCE** measurement, in the 315nm...400nm, peak 360nm, **UVA** spectral range. Measurement range: $0.1\cdot 10^{-3}\text{W}/\text{m}^2$... $2000\text{W}/\text{m}^2$.

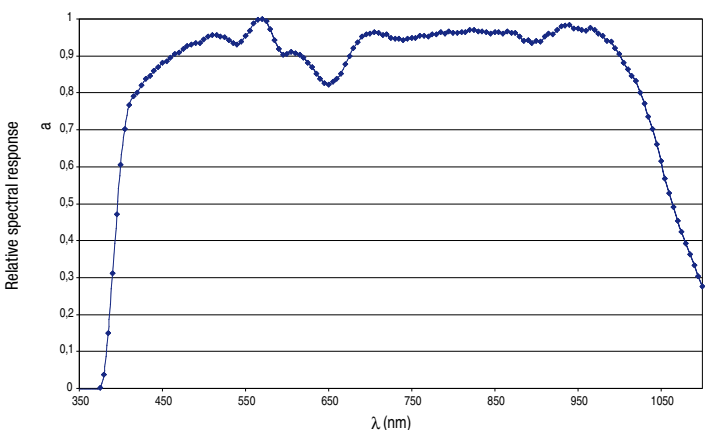
Typical response curve: probe LP 471 UVA



| IRRADIANCE measurement probe LP 471 RAD | | | | |
|--|---|------------------------|------------------------|------------------------|
| Measurement range (W/m^2): | $0.1\cdot 10^{-3}$... $999.9\cdot 10^{-3}$ | 1.000 ... 19.999 | 20.00 ... 199.99 | 200.0 ... 1999.9 |
| Resolution (W/m^2): | $0.1\cdot 10^{-3}$ | 0.001 | 0.01 | 0.1 |
| Spectral range: | 400nm...1050nm | | | |
| Calibration uncertainty: | <5% | | | |
| f_3 (linearity): | <1% | | | |
| f_4 (instrument reading error): | ± 1 digit | | | |
| f_5 (fatigue): | <0.5% | | | |
| Drift after 1 year: | <1% | | | |
| Working temperature: | 0...50°C | | | |

Radiometric probe for **IRRADIANCE** measurement in the spectral range 400nm...1050nm, diffuser for cosine correction. Measurement range: $0.1\cdot 10^{-3}\text{W}/\text{m}^2$... $2000\text{W}/\text{m}^2$.

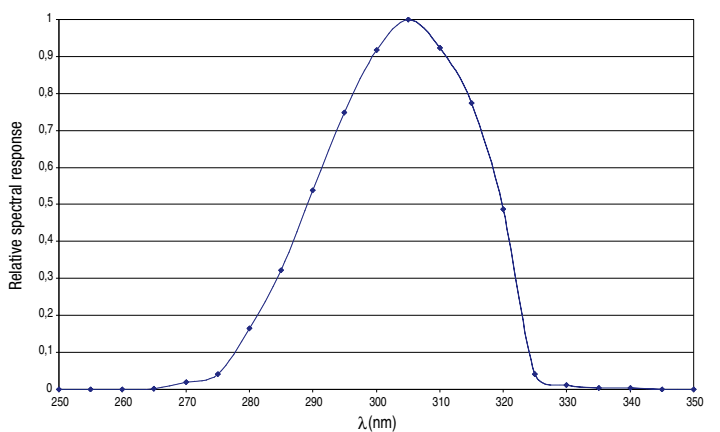
Typical response curve: probe LP 471 RAD



| IRRADIANCE measurement probe LP 471 UVB | | | | |
|--|---|------------------------|------------------------|------------------------|
| Measurement range (W/m^2): | $0.1\cdot 10^{-3}$... $999.9\cdot 10^{-3}$ | 1.000 ... 19.999 | 20.00 ... 199.99 | 200.0 ... 1999.9 |
| Resolution (W/m^2): | $0.1\cdot 10^{-3}$ | 0.001 | 0.01 | 0.1 |
| Spectral range: | 280nm...315nm (Peak 305nm) | | | |
| Calibration uncertainty: | <5% | | | |
| f_3 (linearity): | <2% | | | |
| f_4 (instrument reading error): | ± 1 digit | | | |
| f_5 (fatigue): | <0.5% | | | |
| Drift after 1 year: | <2% | | | |
| Working temperature: | 0...50°C | | | |

Radiometric probe for **IRRADIANCE** measurement, in the spectral range 280nm...315nm, peak 305nm, **UVB**. Measurement range: $0.1\cdot 10^{-3}\text{W}/\text{m}^2$... $2000\text{W}/\text{m}^2$.

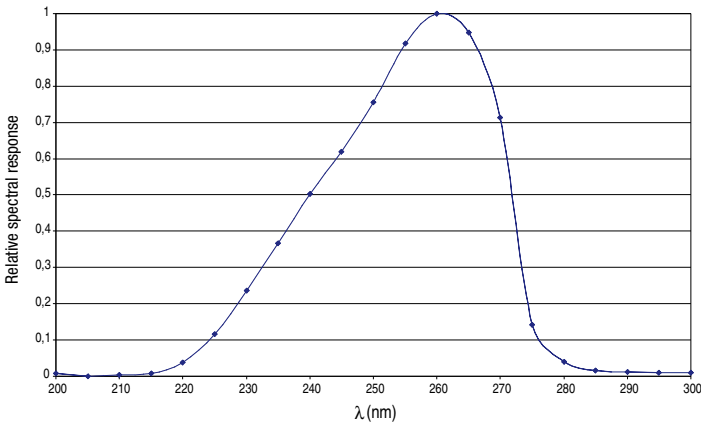
Typical response curve: probe LP 471 UVB



| IRRADIANCE measurement probe LP 471 UVC | | | | |
|--|--|---------------------|---------------------|---------------------|
| Measurement range (W/m ²): | 0.1·10 ⁻³ ... 999.9·10 ⁻³ | 1.000 ... 19.999 | 20.00 ... 199.99 | 200.0 ... 1999.9 |
| Resolution (W/m ²): | 0.1·10 ⁻³ | 0.001 | 0.01 | 0.1 |
| Spectral range: | 220nm...280nm (Peak 260nm) | | | |
| Calibration uncertainty: | <5% | | | |
| f ₃ (linearity): | <1% | | | |
| f ₄ (instrument reading error): | ±1 digit | | | |
| f ₅ (fatigue): | <0.5% | | | |
| Drift after 1 year: | <2% | | | |
| Working temperature: | 0...50°C | | | |

Radiometric probe for **IRRADIANCE** measurement, in the spectral range 220nm...280nm, peak 260nm, **UVC**. Measurement range: 0.1·10⁻³W/m²...2000 W/m².

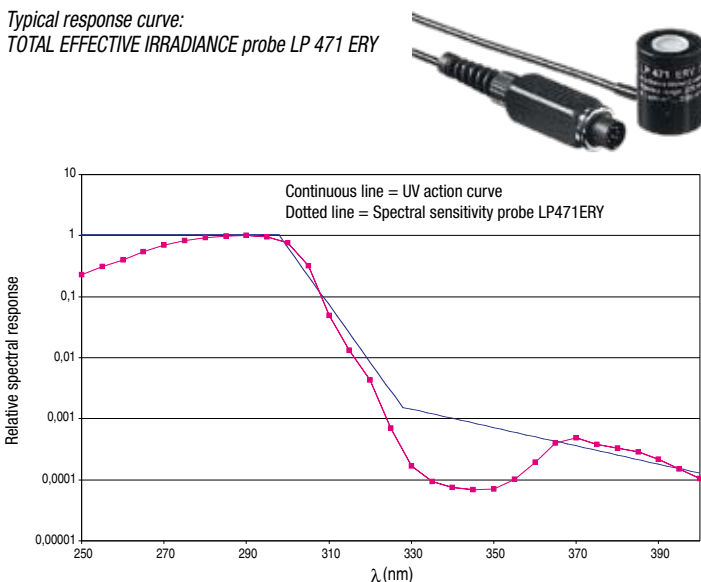
Typical response curve: probe LP 471 UVC



| Measurement probe LP 471ERY of TOTAL EFFECTIVE IRRADIANCE (W/m ²) according to the UV action curve UV (CEI EN 60335-2-27) | | | | |
|---|--|---------------------|---------------------|---------------------|
| Measurement range (W _{eff} /m ²): | 0.1·10 ⁻³ ... 999.9·10 ⁻³ | 1.000 ... 19.999 | 20.00 ... 199.99 | 200.0 ... 1999.9 |
| Resolution (W _{eff} /m ²): | 0.1·10 ⁻³ | 0.001 | 0.01 | 0.1 |
| Spectral range: | UV action curve for erythema measurement (250nm...400nm) | | | |
| Calibration uncertainty: | <15% | | | |
| f ₃ (linearity): | <3% | | | |
| f ₄ (instrument reading error): | ±1 digit | | | |
| f ₅ (fatigue): | <0.5% | | | |
| Drift after 1 year: | <2% | | | |
| Working temperature: | 0...50°C | | | |
| Reference standard: | CEI EN 60335-2-27 | | | |

Radiometric probe for **EFFECTIVE TOTAL IRRADIANCE** (W_{eff}/m²) according to the UV action curve (CIE EN 60335-2-27). Spectral range: 250 nm...400 nm, Measurement range: 0.1·10⁻³W_{eff}/m² ... 2000 W_{eff}/m²

Typical response curve: TOTAL EFFECTIVE IRRADIANCE probe LP 471 ERY



The probe LP 471 ERY measures the total effective irradiance (W_{eff}/m²) according to the UV action curve (CEI EN 60335-2-27). A particular type of photodiode and a combination of special filters bring the spectral response closer to the UV action curve.

CEI EN 60335-2-27 standards establish a maximum allowable dose of 100J/m² for first-time exposure and an annual dose of 15000J/m².

The typical spectral response curve of LP 471 ERY is shown in the Figure together with the UV action curve.

The good accordance between the two curves enables the instrument to take reliable measurements of different types of lamps (and filters) used at present for tanning machines.

Calibration is performed at 290nm using a SIT calibrated photodiode as reference.

ORDER CODES

HD2302.0: The kit consists of the instrument HD2302.0, 3 1.5V alkaline batteries, operating manual, case. **The probes must be ordered separately.**

Probes equipped with SICRAM module

LP 471 PHOT: Photometric probe for **ILLUMINANCE** measurement complete with SICRAM module, spectral response in agreement with standard photopic vision, diffuser for cosine correction. Measurement range: 0.01 lux...200·10³ lux.

LP 471 LUM 2: Photometric probe for **LUMINANCE** measurement complete with SICRAM module, spectral response in agreement with standard photopic vision, vision angle 2°. Measurement range: 0.1 cd/m²...2000·10³ cd/m².

LP 471 PAR: Quantum radiometric probe for the measurement of the photon flow across the chlorophyll range **PAR** (Photosynthetically Active Radiation 400nm...700nm) complete with SICRAM, measurement in μmol/m²s⁻¹, diffuser for cosine correction. Measurement range: 0.01 μmol/m²s⁻¹...10·10³ μmol/m²s⁻¹.

LP 471 RAD: Radiometric probe for **IRRADIANCE** measurement complete with SICRAM module; in the 400nm...1050nm spectral range, diffuser for cosine correction. Measurement range: 0.1·10⁻³W/m²...2000 W/m².

LP 471 UVA: Radiometric probe for **IRRADIANCE** measurement complete with SICRAM module; in the 315nm...400nm, peak 360nm, **UVA** spectral range, quartz diffuser for cosine correction. Measurement range: 0.1·10⁻³W/m²...2000 W/m².

LP 471 UVB: Radiometric probe for **IRRADIANCE** measurement complete with SICRAM module, in the 280nm...315nm, peak 305nm, **UVB** spectral range, quartz diffuser for cosine correction. Measurement range: 0.1·10⁻³W/m²...2000 W/m².

LP 471 UVC: Radiometric probe for **IRRADIANCE** measurement complete with SICRAM module, in the 220nm...280nm, peak 260nm, **UVC** spectral range, quartz diffuser for cosine correction. Measurement range: 0.1·10⁻³W/m²...2000 W/m².

LP 471 ERY: Radiometric probe for **TOTAL EFFECTIVE IRRADIANCE** (W_{eff}/m²) according to the UV action curve (CEI EN 60335-2-27) complete with SICRAM module. Spectral range: 250 nm...400 nm, quartz diffuser for cosine correction. Measurement range: 0.1·10⁻³W_{eff}/m² ... 2000 W_{eff}/m².

LP BL: Base with levelling device for the probes (except LP 471 LUM 2).

Light

